

Wind Funneling at Springfield, MO Due to the Ozark Plateau

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Springfield, Missouri is located between 1200 and 1300 feet above sea level, near the center of the Ozark Plateau. The Ozark Plateau (figure 1) is a deeply dissected plateau that stretches from near the Boston Mountains in northern Arkansas northeast across southern Missouri to just south of St. Louis. The terrain of the Ozark Plateau results in some distinct forecast challenges for the staff at the Springfield WFO, including wind funneling that is common in Springfield during southeast winds.

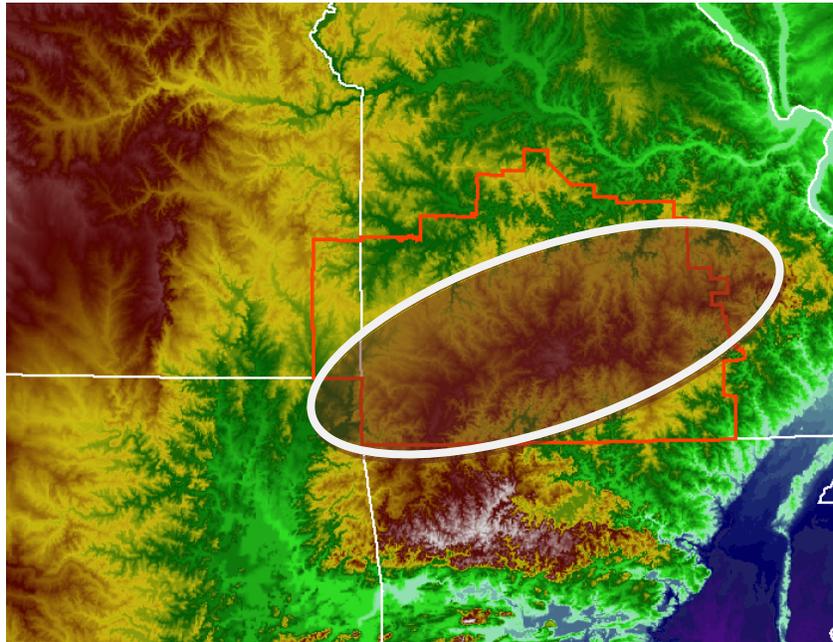


Figure 1. Regional Topographical Map

Figure 2 (below) shows a detailed view of the terrain around Springfield, which is indicated by the "Home" label. This map shows Springfield to be located between two distinct ridges of higher terrain along the Plateau. The first is to the southwest over portions of Barry and Lawrence Counties, where terrain rises to near 1600 feet ASL. The other area of enhanced terrain is across much of Wright and Webster Counties, with the highest terrain near Fordland, Missouri, with elevations near 1700 feet ASL. In addition to the ridges along the top of the Plateau, much lower terrain associated with the White River Valley extends to the south and east of Springfield across southern Missouri and northern Arkansas.

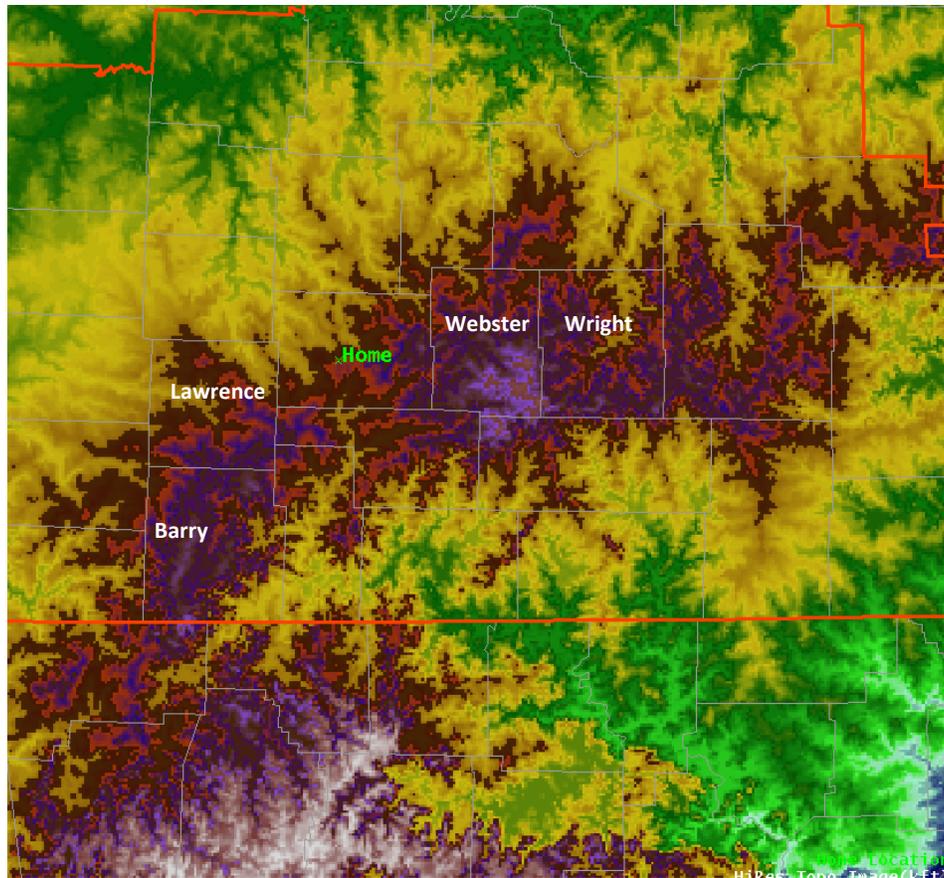


Figure 2. Detailed View of Terrain near Springfield (Indicated by "HOME")

One can easily see how this terrain produces a distinct geographic funnel for southeasterly winds, as momentum is funneled northwest up the White River Valley, and eventually forced between the ridges to the northeast and southwest of Springfield. It is an accepted forecast "rule of thumb" at the Springfield WFO that winds between approximately 140 and 170 degrees are most favored for funneling, with a distinct increase in wind speed observed at 160 degrees. The attached wind rose (figure 3) shows a clear increase in the percentage of 12-20 KT sustained wind speeds observed at the Springfield-Branson National Airport (KSGF) for southeasterly winds. This is particularly evident when compared to the wind rose for the Joplin Regional Airport (KJLN), which shows the highest wind speeds occurring with south to southwest, as opposed to southeast. The KJLN wind rose is labeled as Figure 4.

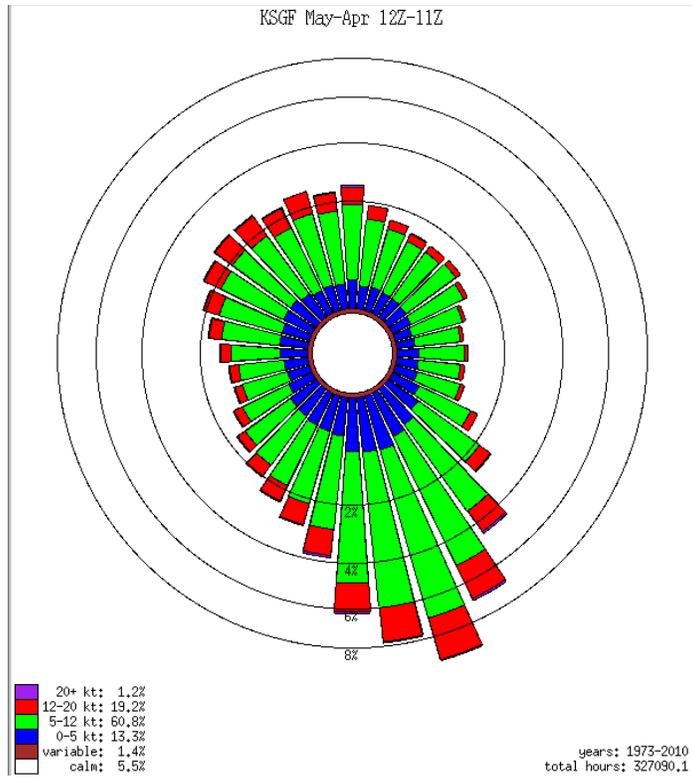


Figure 3. Wind rose for all months and hours at KSGF.

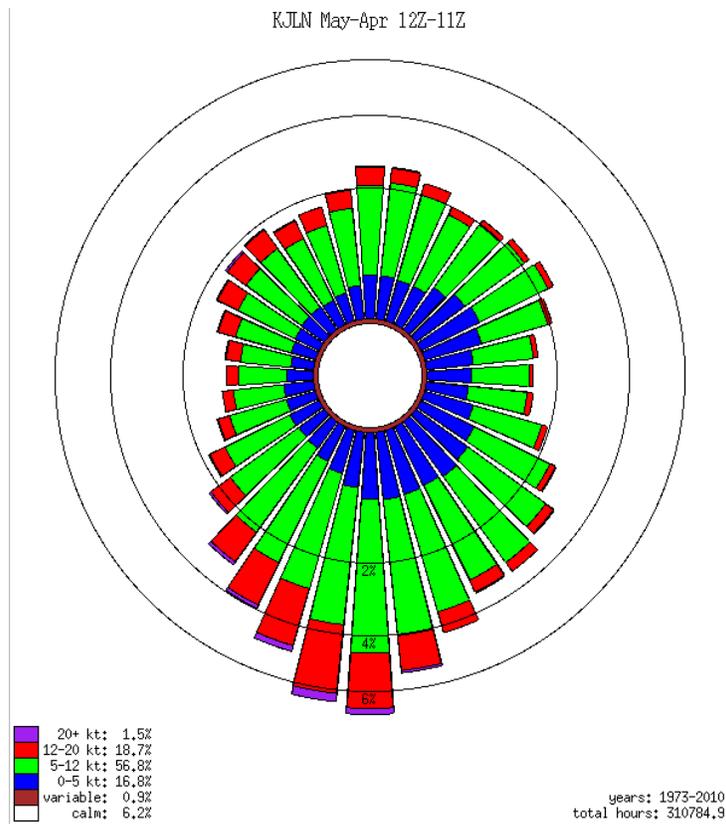


Figure 4. Wind rose for all months and hours at KJLN.

For forecasters at WFO Springfield, wind funneling presents a forecast challenge not only for the public forecast, but also presents a distinct aviation challenge. Winds that drastically increase as they veer or back to 140-170 degrees can result in the need for a change in runway configuration. Thankfully, these funneling effects are consistent enough to be anticipated well ahead of time in most cases. In addition to local forecast knowledge and rules of thumb, the consistent nature of this phenomenon is oftentimes at least hinted at by MOS guidance, though the full signal is occasionally muted.